

Indiana University – Purdue University Fort Wayne
Opus: Research & Creativity at IPFW

Computer and Electrical Engineering Technology &
Information Systems and Technology Senior Design
Projects

School of Engineering, Technology and Computer
Science Design Projects

4-27-2004

Short Range Laser Based Distancing Circuit with Transimpedance Sensor

Joe Turner

Indiana University - Purdue University Fort Wayne

Follow this and additional works at: http://opus.ipfw.edu/etcs_seniorproj



Part of the [Computer Sciences Commons](#), and the [Engineering Commons](#)

Opus Citation

Joe Turner (2004). Short Range Laser Based Distancing Circuit with Transimpedance Sensor.
http://opus.ipfw.edu/etcs_seniorproj/18

This Senior Design Project is brought to you for free and open access by the School of Engineering, Technology and Computer Science Design Projects at Opus: Research & Creativity at IPFW. It has been accepted for inclusion in Computer and Electrical Engineering Technology & Information Systems and Technology Senior Design Projects by an authorized administrator of Opus: Research & Creativity at IPFW. For more information, please contact admin@lib.ipfw.edu.

**SHORT RANGE LASER BASED DISTANCING CIRCUIT WITH
TRANSIMPEDANCE SENSOR**

by

Joe Turner

April 27, 2004

Prepared for

Professor Paul Lin
ECET 491 Senior Design Phase II
ECET Department

and

Professor Karen Griggs
W421 Technical Writing Projects
English & Linguistics Department

Purdue University at Ft. Wayne
Ft. Wayne, Indiana

ABSTRACT

On an automated manufacturing line different objects are sometimes run through on the same line. This is done to save time and money in engineering, testing, and maintenance that a new line entails, however, there is a problem by doing this in that there is no efficient way to count the number of each of the different parts that have been run through a line. This report specifies a way to recognize the different objects by measuring the distance between the sensor and the object; however, the circuit discussed in the report does not complete the counting of each object.

The research involved IEEE articles and books along with much experimentation. The IEEE articles and books gave the equations, terminology, and offered some circuit interface insights that were utilized throughout the duration of the project. Experimentation was conducted on the position relationship between the laser and the sensor, the effect of ambient light falling on the sensor, and the intricacies of interfacing a digital integrated circuit into an analog circuit without using a digital to analog converter.

The conclusions from the project are as follows. In order for the circuit to have maximum stability, it should be enclosed in a dark area such as a control box that could be mounted on a manufacturing line. The circuit has a range of about ten inches to where it is most accurate. Finally, the laser and photodiode must be placed within two inches of each other in order to function properly.

TABLE OF CONTENTS

	Page(s)
Chapter 1 INTRODUCTION.....	1 – 3
Problem Topic.....	1
Background.....	1
Criteria and Parameters.....	2 – 3
Research Methodology.....	2
Primary Purpose.....	3
Overview.....	3
Chapter 2 CIRCUIT REALIZATION.....	4 – 9
Components.....	4 – 8
Budget.....	8 – 9
Chapter 3 CIRCUIT DESIGN.....	10 – 11
Chapter 4 RESULTS.....	12 – 13
Limitations.....	12
Data.....	12 – 13
Future Research.....	13
Conclusion.....	14
REFERENCES.....	15
APPENDIX.....	A – C
Components Specifications.....	A1 – A4
OPT101P.....	A1
CD74HC02.....	A2
MAX323CPA.....	A3
PLP6503AZ-B.....	A4
Board Layout.....	B
PIC Program.....	C

LIST OF ILLUSTRATIONS

	Page(s)
Figure 1. Block diagram.....	4
Figure 2. LM555 circuit.....	6
Figure 3. NOR gate wiring diagram.....	7
Figure 4. MAX323CPA pin configuration.....	8
Figure 5. Total cost of each component.....	8 – 9
Figure 6. Circuit schematic for the finished product.....	10